Global Environmental Change 48 (2018) 216–225

Contents lists available at ScienceDirect

Global Environmental Change

journal homepage: www.elsevier.com/locate/gloenvcha

Gendered discourse about climate change policies

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ARTICLE INFO

Keywords:
Gender
Climate change
Political discourse
Masculinity
Environmental justice

ABSTRACT

Extending theory and research on gender roles and masculinity, this work predicts and finds that common ways of talking about climate change are gendered. Climate change policy arguments that focus on science and business are attributed to men more than to women. By contrast, policy arguments that focus on ethics and environmental justice are attributed to women more than men (Study 1). Men show gender matching tendencies, being more likely to select (Study 2) and positively evaluate (Study 3) arguments related to science and business than ethics and environmental justice. Men also tend to attribute negative feminine traits to other men who use ethics and environmental justice arguments, which mediates the relation between type of argument and men's evaluation of the argument (Study 3). The gendered nature of public discourse about climate change and the need to represent ethical and environmental justice topics in this discourse are discussed.

1. Gendered discourse about climate change policies

The way environmental problems are framed sets the stage for how the problems are assessed and addressed. In economically wealthy countries, climate change tends to be framed as a problem caused by technology (e.g., industrialization) and understood through science. Climate change problems are, therefore, perceived as solvable via technological advances, the management of natural resources, and economic expansion (Caniglia et al., 2015). By contrast, in economically poorer countries, climate change is framed as an issue of ethics and environmental justice (Caniglia et al., 2015). The latter framing separates those who cause the problems from those who are unjustly and disproportionately harmed, placing responsibility for solving the problems and remedying harm on those who caused the problems (Swim and Bloodhart, 2018).

Frames may influence discourse about climate change in several important ways. First, a science and business frame may allow powerful countries and industries to reinforce, maintain, and expand their economic and social power. In contrast, an ethical and justice frame may deconstruct and challenge current power structures (Caniglia et al., 2015). Second, framing may influence characteristics of policies considered worthy of development and implementation. For example, different frames suggest different prioritization of impacts addressed by climate change policies (e.g., emissions vs. health, economic growth vs. social equity; NAACP, 2012). Third, framing may influence who is included in decision making. If those concerned about environmental justice – perhaps those most detrimentally affected by climate change – do not have their concerns expressed, they may perceive their views as disrespected or deprioritized. This sense of exclusion can challenge perceptions of procedural justice and, as a result, the perceived legitimacy of decision making processes (Tyler and Blader, 2003). Thus, it is important to determine what influences preferences for these two different frames.

We propose that the dominant frames used in discourse about climate change are gendered and the gendered natures of these frames, in turn, influence men's and women's (a) impressions of those use differing frames and (b) subsequent willingness to use the different frames. Below we explain why the science and business frames are likely to be perceived as congruent with men's roles, whereas ethical justice frames are likely to be perceived as congruent with women's roles (Eagly et al., 2000). Then we consider how these perceptions might influence men's and women's preferences for the two frames based upon gender role congruity theory and research on masculinity. Gender role congruity theory proposes that men and women engage in behaviors that are congruent with traditional gender roles (Eagly, 1987; Eagly et al., 2000). A reason for this gender matching is to avoid social penalties for deviance from these socially prescribed roles (Diekman and Eagly, 2008; Eagly et al., 2000). Research on masculinity suggests that men's preferences for gender congruent frames will be stronger than women's preferences for gender congruent frames due to different characteristics of male versus female role norms and prescriptions (Kimmel, 2008; Vandello et al., 2008).

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https://doi.org/10.1016/j.gloenvcha.2017.12.005
Received 19 July 2017; Received in revised form 18 November 2017; Accepted 17 December 2017
Available online 04 January 2018
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1.1. Gendered nature of frames

There are at least three reasons to predict that scientific and business frames are more likely associated with men than women. First, the domains of science and technology are more strongly associated with men than women (Hill et al., 2010). Second, men are more likely than women to be in high status positions, such as leadership roles in business and government (Eagly and Karau, 2002). Third, like displays of masculinity (Bosson et al., 2009; Kimmel, 2008; Rudman and Glick, 2008; Vandello et al., 2008), scientific and business frames are associated with power, status, and agency − all of which are stereotypes of men (Caniglia et al., 2015; Diekman and Eagly, 2000).

By contrast, ethical and justice frames are more likely associated with women than men. Ethical and justice frames focus on the impacts that environmental problems have on others and concern about others is congruent with traditional stereotypes of women and female gender roles (e.g., warmth, tender mindedness, benevolence; Diekman and Eagly, 2008; Eagly et al., 2000; Wood and Eagly, 2012). In fact, during the progressive era of the late 1800′s and early 1900′s people made these associations with women who were particularly likely to argue that it was important to preserve resources so that children and future generations could have clean and healthy homes (Rome, 2006). More currently, women have been found to be more pro-environmental than men (Zelezny et al., 2000) and less likely than men to deny the existence of human caused climate change (McCright, 2010; McCright and Dunlap, 2011). Further, people expect that women to be likely than men to be concerned about climate change (Swim and Geiger, 2018).

Our first prediction follows from the research reviewed above (*Hypothesis 1*). We predict that the framing of climate change in terms of science and business frames will be associated with men (vs. women), whereas framing in terms of ethical and justice concerns will be associated with women (vs. men).

1.2. Gender matching

Grounding our research in gender role congruity theory, we further suggest that the gendered nature of the framing of climate change discourse could contribute to gender differences in frame preference. First, gender roles are behavioral norms that define appropriate, gender-specific, and culturally prescribed behaviors that press people to engage in gender-role congruent behaviors (Diekman and Eagly, 2008; Eagly et al., 2000). This gender matching has been demonstrated in a range of preferences, attitudes, and behaviors, including political behaviors (Diekman et al., 2013; Diekman and Schneider, 2010; Eagly and Diekman, 2006; Eagly et al., 2003). Second, strong incentives for role-congruent behavior, potent punishments associated with role incongruent behavior, and possible internalization of these gender-based expectations, perpetuate matches between one's gender and role-congruent behavior. Those who enact gender role incongruent behaviors are likely to be perceived as gender deviants–atypical members of their gender. Many studies indicate that both female and male gender deviants are often socially excluded and economically punished providing motivation to not be a gender deviant (e.g., Carli et al., 1995; Eagly et al., 1992; Holland et al., 2016; Hunt et al., 2016; Pascoe, 2011; Rudman, 1998; Rudman and Fairchild, 2004).

This theory can be applied to attitudes about argument frames. First, those who use frames that are associated with their gender would be behaving gender congruently and those that use frames associated with a different gender would be behaving gender incongruently. Pressures for gender matching would result in men preferring the stereotypically masculine science-business frame and women preferring the stereotypically feminine ethical-justice frame. Second, those who use gender incongruent frames would be considered a gender deviant and pressures to avoid being seen as a gender deviant would motivate attitudes toward the argument frames. Gender deviants are likely expected to have personality traits stereotypically associated with the other gender and/or lack attributes stereotypically associated with their own gender (cf Deaux and Lewis, 1984; Haines et al., 2016). Additionally, because gay and lesbian people are stereotyped in cross-gender terms (Kite and Deaux, 1987), perceived gender deviance is likely associated with assumptions about homosexuality, with gender deviant men being assumed to be gay men and with gender deviant women assumed to be lesbian (Rule and Alaei, 2016). Thus, ascribing feminine traits and homosexuality to a man who uses an ethic-justice frame more than a man who uses a science-business frame and ascribing masculine traits and homosexuality to a woman who uses a business-science frame more than a woman who uses a science-business frame would be diagnostic that this man and woman were being seen as gender deviants. Further, avoidance of being seen as a gender deviant would be revealed if gender deviant ascriptions subsequently influenced how favorably the two different frames were perceived.

Historically, consistent with this logic, men who supported environmentalism, which had been construed in stereotypically feminine terms as concern for others, were treated as gender deviants (Rome, 2006). In the late 1800′s, a tactic used to argue against environmental reasons for building the Hetch Hetchy dam characterized male reformers, including John Muir, as effeminate and unmanly. Moreover, men during the progressive era purposefully choose to use science and economic terms to promote environmentalism because it countered the association between femininity and environmentalism (Rome, 2006). Yet, this form of mockery continued into in the late 1900′s. For example, men who supported Rachel Carson, author of the book "Silent Spring" which is credited with starting the environmental movement, were concerned that they would receive the emasculated characterization of "birds and bunny boys."

Integrating the foregoing points leads to two additional hypotheses. We predict that men will prefer science and business frames over ethical and justice frames and women will prefer ethical and justice frames over science and business frames (*Hypothesis 2)*. Thus, while Hypothesis 1 is about perceiving arguments to be gendered, consistent with gender role congruity theory, here we predict that men's and women's preferences will follow these stereotypes. Further, we predict that people who choose gender incongruent frames when discussing climate change will be perceived as gender deviants and, also consistent with gender role congruity theory, these perceptions will account for gender differences in preferred ways to discuss climate change (*Hypothesis 3*). Thus, Hypothesis 3 is about the psychological mechanisms that underlie gender matching.

1.3. The personal and societal importance of masculinity

An important caveat to the aforementioned predictions is that tendencies to avoid being perceived as gender deviants may be stronger for men than women. Thus, Hypothesis 2 and 3 may be more applicable to men than women. This suggestion is supported by three lines of converging research. First, although both women and men experience negative consequences for gender deviance, in the last 60 years, gender roles have expanded more for women than men, allowing women to behave in more variable ways than men can before violating gender expectations and facing punishment (Diekman and Eagly, 2000; Diekman and Goodfriend, 2006; Twenge, 1997). Thus, a narrower set of behaviors deemed appropriately masculine makes men more vulnerable than women to being seen as a gender deviant. Second, because dominance and one's place in social hierarchies is frequently challenged, particularly by other men trying to be dominant, men's ability to establish that they are masculine is more precarious than women's ability to establish that they are feminine. To achieve and maintain one's status as a "good man" requires much behavioral monitoring and consistent behavioral acts of dominance and status. In contrast, femininity is awarded through physical maturation (Vandello et al., 2008). Third, masculinity is associated with respect and status which could help with the ability to influence (Deaux and Lafrance, 1998). Thus, women may

Table 1
Participant Demographics.

	Study 1	Study 2	Study 3a	Study 3b
Percent women	53%	52%	0%	100%
Age	*M* = 41 *s.d. = 14.18* *range =19–75*		*M* = 33; *s.d. = 11.01;* *range = 19–70*	*M* = 34 *s.d. = 10.72* *range = 19–70*
Race/Ethnicity				
White/Caucasian	84.7%.		75.6%	78.9%
Black/African American	6.5%		10.6%	8.2%
Asian	2.4%		5.0%	5.1%
Hispanic/Latino/Latina	2.4%		4.4%	4.7%
Native American	0.0%		0.6%	0.4%
Mixed	3.1%		2.8%	2.3%
Education				
High School/GED	8.9%			
Some college	27.4%			
2-year degree	16.1%			
4-year degree	33.1%			
Advanced degree	14.5%			
Political orientation (1 = extremely liberal;7 = extremely conservative)	*M* = 3.40 *s.d. = 1.62*	*M* = 3.81 *s.d. = 1.35*	*M* = 3.59 *s.d. = 1.81*	*M* = 3.65 *s.d. = 1.96*
Party Identification				
Republican			22.0%	19.1%
Democrat			36.1%	43.4%
Independent			36.1%	27.7%
No party/Not interested			7.8%	9.0%
Other			2.9%	0.4%

want to be seen as masculine when arguing for policies.

In sum, research on masculinity suggests a potential caveat to our gender matching hypothesis (Hypothesis 2). Men's preferences for science and business frames over ethical and justice frames may be stronger than women's preferences for ethical and justice frames over science and business frames. Further, explaining this caveat and qualifying Hypothesis 3, a man who uses feminine over masculine frames may be seen as more of a gender deviant than a woman who uses masculine over feminine frames resulting in more incentive for men than women to avoid gender incongruent frames. Alternatively, even if both are seen as gender deviants, expected gender deviance for using gender-role incongruent frames may demotivate men more than women given possibly greater value placed on masculine than feminine traits when trying to influence others opinions.

1.4. Present research

The present work examined preferences for climate change frames within the context of arguments used to support and oppose climate change policies. The studies assessed a) whether argument frames associated with climate change policies are gendered (Study 1; Hypothesis 1), b) whether gender framings impact gender differences in preferences for (Study 2) and evaluations of (Study 3) these argument frames (Hypothesis 2), and c) whether the evaluations can be accounted for by perceiving that those who prefer gender-role incongruent frames are gender deviants (Study 3; Hypothesis 3). However, we also expect that Hypothesis 2 and 3 would be more strongly supported among men than women.

2. Study 1

To test Hypothesis 1, men and women indicated whether women versus men would have been more likely to use several different science-business frames and ethical-justice frames. These arguments were paired with eight different policies to ensure that documented effects generalize across a variety of policies. We also manipulated whether the argument was for or against the policy. People are more likely to assume that women are concerned about the climate than men so they may assume that the pro-arguments are from a woman and con-arguments are from a man (Swim and Geiger, 2018). However, we predict that even with this assumption gender of arguments would predict gendered expectations for both pro- and con-arguments.

2.1. Method

2.1.1. Design

Two samples were used to increase the number of policies and policy arguments examined. Sample 1a and 1b read two different sets of four policies. Each policy was paired with four arguments tailored to each specific policy. Participants rated whether women versus men would be more likely to use the arguments. Thus, for both samples, we used a 2(Argument frame: Science/business vs. ethical/justice) x 2(Argument position: Pro vs. con) x 4(Specific policies) repeated measure design. As a reminder, manipulations of Argument position and Specific policies were included to test generalization across levels of these variables; we predicted that expected argument frame effects would be found within each of these variables. Power analyses for within participant variables using an effect size of 0.25, an error probability equal to 0.05, power equal to 0.95, revealed a required total sample size of 16 participants to test within participant effects. Additional participants were recruited to test for possible non-predicted interactions between participant gender and the within participant variables and between sample (i.e., different sets of policies) and the within participant variables. Power analyses using the same assumptions recommend 24 participants to test these between-within participant interactions. Additional participants also allowed us to be more confident in our results if we did follow-up *t*-tests.

2.1.2. Participants

One-hundred twenty-four participants (Sample 1a: n = 59; Sample 1b: n = 65) were recruited through Amazon's Mechanical Turk (MTURK), limited to those who resided in the U.S., and paid $0.50 to complete the survey. Data from an additional 24 participants were removed from analyses because they failed an instructional check (not providing a requested response) and/or an attention check (not remembering the policies they read). Participants were slightly liberal

and, on average, middle age (M = 41, range 19–75). (See Table 1 for more details about demographics).

2.1.3. Procedure

After reading a brief description of a policy, participants read four arguments and indicated the likely gender of people using the argument. This was repeated for three additional policies. Participants then completed individual difference measures before being debriefed.

2.1.4. Materials

Across the two samples, eight policies were read (See supplemental materials). Sample 1a read four policies that encouraged reduction in individual's use of energy (e.g., influencing transportation choices). Sample 1b read four industrial level policies (e.g., carbon capture and storage). Each policy was described in one or two sentences and all descriptions were of similar word length.

The four arguments paired with each policy were created by crossing argument frame (science-business or ethical-justice) and argument position (pro or con). In other words, pro and con arguments that followed descriptions of the policy were framed in stereotypically masculine ways (i.e., Scientific- and business-framed arguments based on traditional masculine roles) or framed in stereotypically feminine ways (i.e., ethical- and justice-arguments based on feminine caretaking roles). Each argument was presented with two or three sentences that resulted in a similar number of words per argument (see Supplemental materials).

2.1.5. Dependent measures

Participants rated the likelihood that each argument would be more likely to be made by women vs. men (1 = "most women but few men" to 5 = "most men but few women.")

2.2. Results

Participants' estimates of the likelihood of the speaker's gender were submitted to a 2(Argument frame: science-business vs. ethical-justice) x 2(Argument position: Pro vs. con) x 4(Specific policy) x 2(Policy focus: Sample 1a's focus on individual energy use vs. Sample 1b's focus on Industrial level policies) x 2(Participant gender: Men vs. women) mixed-model Analysis of Variance (ANOVA). The first three variables in this design were within-participants variables, whereas policy focus and participant gender were between-participants variables. There were no main or interactive effects involving participant gender. Consistent with predictions that frames would be gendered (Hypothesis 1), participants were more likely to associate the science-business arguments with men (M = 3.42, $s.d.$ = 0.41, 95% CI[3.35, 3.49]) and were more likely to associate the ethical-justice arguments with women (M = 2.73, $s.d.$ = 0.41, 95% CI[2.68, 2.80]), as indicated by an argument frame main effect, $F(1111) = 176.55$, $p < .001$, $\eta^2 = 0.61$. Participants were also more likely to associate the con-arguments with men (M = 3.20, $s.d.$ = .40, 95% CI[3.14, 3.28]) and the pro-arguments with women (M = 2.96, $s.d.$ = .42, 95% CI[2.86, 3.00]), as indicated by an argument position main effect, $F(1111) = 36.26$, $p < .001$, $\eta^2 = 0.25$. These main effects were qualified by an interaction between argument frame (science-business vs. ethical-justice) and argument position (pro vs. con), $F(1111) = 8.38$, $p < .005$, $\eta^2 = 0.07$. Yet, follow-up tests indicated that all predicted differences between argument frames were significant from each other within the pro and con arguments ($p < 0.05$; see Fig. 1).[1]

[1] There was also a four-way interaction between argument frame, argument position, specific policy, and policy focus, $F(3333) = 6.51$, $p < .001$, $\eta^2 = 0.06$, but, again, the predicted argument frame effects were found for all policies (see Supplemental materials).

2.3. Discussion

Study 1 findings indicate that science-business arguments were perceived to be associated with men more than women, whereas ethical-justice arguments were associated with women more than men. This leads us to our second study which tests whether these perceptions match actual personal preferences (Hypothesis 2) and whether gender matching is stronger for men than women (qualification to Hypothesis 2).

3. Study 2

In Study 2 we examined whether predicted gender matching effects, with the effects predicted to be stronger for men than women, would emerge in two policies used in Study 1: One targeted reducing individual energy use (i.e., illegalization of stand-by mode) and the other targeted energy companies (i.e., carbon capture and storage). We tested whether effects would be found within both pro- and con-arguments and would remain when controlling for political orientation, environmentalist identity, and climate change beliefs.

3.1. Method

3.1.1. Design

Study 2 used a 2(Argument position: Pro vs. con) x 2(Policy focus: Individual Energy reduction vs. Energy companies) x 2(Participant gender: Men vs. women) mixed-model design. Argument position was a within-participant variable in this design, whereas the other variables were between–participant variables. The dependent measure in this study was the number of science-business arguments selected, which, as explained below, is the inverse of the number of ethical/justice arguments. Power analyses, assuming a moderate effect size, error a probability equal to 0.05, power equal to 0.95, and the design noted above, revealed a required sample size of 195 participants.

3.1.2. Participants

Participants consisted of 122 men and 133 women recruited from an undergraduate Psychology department participant pool at a large Northeastern American public university. Data from an additional thirteen participants who did not complete individual difference measures and/or an attention check (i.e., they incorrectly identified study information) were removed from the sample. All received course credit for their participation. Respondents' political orientation tended to skew slightly liberal (see Table 1). Additional demographic questions were not asked in order to minimize the length of the study.

3.1.3. Procedure and materials

Participants arrived at a classroom set up with 16–30 computers. Introductory materials informed participants that they would be planning for a debate to present to a panel of judges (see supplemental materials) about whether a particular policy would be a good way to address climate change. They were told that the arguments would not be about the existence of human caused climate change. In order to reinforce this point, they were given information about climate change, tested their knowledge of the information provided, and provided correct answers to the questions. Participants were told that their task would be to select three pro-policy arguments from a list of six pro-arguments for use in the debate and select three con-policy arguments from a list of six con-arguments. They were told they needed to select both pro- and con- arguments because debate teams had to be prepared to take either side of the debate.

Each participant was randomly assigned to read one of two policies (illegalization of standby mode policy or the carbon capture and storage). Participants were then randomly assigned to read either the pro- or the con-arguments first. Derived from materials used in Study 1, half of the six pro-arguments used science-business frames and half used

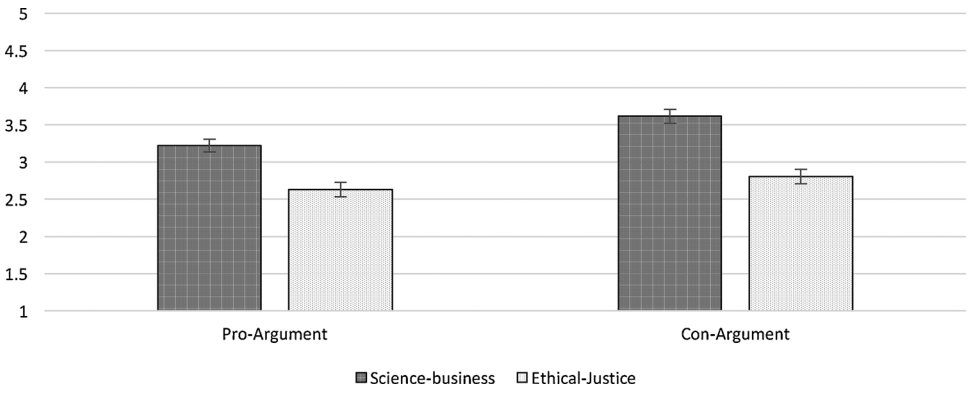

Fig. 1. Mean and 95% confidence intervals for estimated likelihood of the gender of speaker by argument frame and position (Study 1).
Note: Ratings ranged from 1 = mostly women to 5 = mostly men.

ethical-justice frames; likewise, half of the six con-arguments used science-business frames and half used ethical-justice frames (see Supplemental materials). After selecting arguments, participants wrote two to three sentences explaining their selection of arguments. Participants then completed individual difference measures and demographics, before being debriefed and given credit. (See supplemental materials about pilot testing confirming gendered perceptions of arguments, that ethical-justice and business-science were perceived as such, ratings of open ended statements, and two individual difference measures not mentioned below).

3.1.4. Dependent measures

On their respective computers, participants were asked to "drag" their top three preferred arguments into a box next to the list of arguments that indicated that these were the arguments they would use during their debate. Responses ranged from 0 (no science-business arguments) to 3 (all science-business arguments) or 0 (no ethical-justice arguments) to 3 (all ethical-justice arguments). The number of ethical-justice arguments is the exact inverse to the proportion of science-business arguments because participants were told to select three pro- and three con-arguments. Thus, we only present results for the number of science-business arguments selected.

3.1.5. Individual difference measures

Environmentalist identity was measured with the single item, "Would you describe yourself as an environmentalist?" (1 = "Yes, definitely", 2 = "Yes, somewhat", and 3 = "No"). Few (n = 11) indicated they were definitely an environmentalist so we combined the two "yes" responses to create a dichotomous measure of environmentalist identity.

Using 5-point scales (1 = "Definitely not", 2 = "Probably not", 3 = "Maybe", 4 = "Probably yes", 5 = "Definitely yes"), participants indicated their *global climate change beliefs* by completing the following three items: (1) Do you believe there is solid evidence for the existence of climate change?; (2) Do you believe current climate change is mostly because of human activity, such as burning fossil fuels?; and (3) Do you believe climate change is a serious problem? ($\alpha = 0.79$). Additionally, *climate change concern* was assessed with a single item where participants self-classified into one of the "Six Americas" groupings ("Alarmed," "Concerned", "Cautious," "Disengaged," "Doubtful", or "Dismissive"). The six categories are based upon a segmentation analysis of members of the U.S. population (Leiserowitz et al., 2014; Swim and Geiger, 2017).

3.2. Results

3.2.1. Argument selection

The number of science-business arguments selected were analyzed with a 2(Argument position: Pro vs. con) x 2(Policy focus: Individual Energy reduction vs. Energy companies) x 2(Participant gender: Men vs. women) mixed-model ANOVA, with repeated measures on the first variable. Consistent with gender matching predictions, men tended to select a higher proportion of science-business arguments than women did, $F(1251) = 4.46$, $p = .04$, $\eta^2 = 0.02$. Additionally, a one-sample *t*-test that compared their mean to the midpoint of the scale (1.5 out of the 3 selected arguments) confirmed that men tended to select more science-business than ethical/justice arguments ($M = 1.67$, *95% CI* [1.58, 1.76]). Consistent with predictions that gender-matching would be weaker in women than men, women, on average, tended to select equal numbers of science-business and ethical-justice arguments ($M = 1.54$, 95% *CI* = [1.45, 1.62]). The only other significant effect was that participants, regardless of gender, tended to select more masculine con-arguments ($M = 1.69$, *95% CI* = [1.62, 1.77]) than masculine pro-arguments ($M = 1.51$, *95% CI* = [1.42, 1.60]), $F(1251) = 9.48$, $p = .00$s, $\eta^2 = 0.04$). The lack of interactions with the policy focus and the position of the argument supports the generalizability of the effects.

The effect of gender remained significant after controlling for climate change beliefs and concern, environmentalist identity, and political orientation, $F(1243) = 4.21$, $p = .04$, $\eta^2 = 0.02$. This indicates that the effects for gender were not a function of potential confounds between gender and these individual difference measures. The main effect for argument position (pro or con) was no longer significant after controlling for these variables, $F(1242) = 0.72$, $p = .40$, $\eta^2 = 0.003$.

3.3. Discussion

Results of Study 2 supported the prediction that gender-matching effects would occur on argument preferences and would be stronger for men than women. Men tended to select more masculine (i.e., science-business) arguments than feminine (i.e., ethical-justice) arguments. These results could not be explained by participants' climate change beliefs and concerns, environmentalist identity, political orientation, or gender identification. Interestingly, consistent with our predictions that gender role pressures would be stronger for men than women, although women and men in Study 1 expected gender differences for both types of argument frames, gender-matching tendencies influenced men's (but not women's) actual selection of policies for use in Study 2.

What remains unclear from the current results is the psychological reason for gender matching. Thus, Study 3 examined whether gender matching effects can be explained by expecting that policy advocates who use gender-incongruent arguments would be gender deviants.

4. Study 3

Using a non-student sample, Study 3 retested the gender matching prediction, whether it would be stronger for men than women, gender matching effects would be found across both pro- and con-arguments, and predicted effects would remain significant when controlling for political beliefs. Study 3 also tested whether expectations about being seen as a gender deviant is a psychological mechanism that could

account for framing preferences (Hypothesis 3). Perceived gender deviance was assessed via gendered traits ascribed to the speaker and expected sexual orientation of the speaker. Specific mechanism predictions tested 1) whether gender in-group speakers who use gender-role incongruent argument frames would be perceived as gender deviants more so than those who used gender-role congruent argument frames and, 2) whether perceptions of gender deviance of speakers could explain (i.e., mediate) gender matching effects.

4.1. Method

4.1.1. Design

A 2(Argument frame: Business-science vs. ethical-justice) x 2(Argument position: Pro vs. con) between-participants design was conducted on parallel samples of men (Study 3a) and women (Study 3b). Because type of policy did not affect outcomes in either Study 1 nor Study 2, we used only one policy in Study 3. Power analyses, assuming a moderate effect size, with error probability equal to 0.05 and power equal to 0.95, revealed a required a sample size of 74 participants for regression analyses used to test mediation and 210 participants for analyses using ANOVA.

4.1.2. Participants in study 3a

Participants consisted of 180 men recruited from Amazon's Mechanical Turk (MTURK), limited to those who resided in the U.S., and paid $0.50 for their participation. Data from an additional eight participants who failed an instructional check were removed from the sample. Data were also removed from seven additional participants who failed an attention check by selecting a female name as policy advocate's name as presented in the materials (corresponding to the incorrect gender associated with the advocate) from a list of two male and two female names. On average, participants were in their thirties (M = 33, range 19 to 70), slightly liberal and about equally likely to identify as Republican, Democrat, and Independent. (See Table 1 for more details about demographics).

4.1.3. Participants in study 3b

Participants consisted of 256 women recruited from Amazon's Mechanical Turk (MTURK), limited to those who resided in the U.S., and paid $0.50 for their participation. Data from an additional five participants who failed an instructional check were removed from the sample. Data were also removed from three additional participants who failed an attention check by selecting a male name as the name policy advocate's name as presented in the materials (corresponding to the incorrect gender associated with the advocate) from a list of two male and two female names. On average, participants were in their thirties (M = 34, range 19–70), slightly liberal and most likely to identify as Democrats and about as likely to identify as Republican and Independent. (See Table 1 for more details about demographics.)

4.1.4. Procedure and materials

Participants completed the study online. After reading a description of the Illegalization of Stand-by Mode policy used in Study 2 (see Appendix), participants were randomly assigned to read either three pro-science-business, three con-science-business, three pro-ethical-justice, or three con-ethical-justice arguments that were used in Study 2. The arguments were associated with either a man named David (Study 3a) or a woman named Diane (Study 3b). Participants then completed the dependent and demographic measures.

4.1.5. Dependent measures

4.1.5.1. Trait ratings. Using a scale of 0% (not at all) to 100% (completely), participants indicated the likelihood that the speaker had 12 traits. As indicated by pilot testing (see Swim and Geiger, 2018), these included three traits tapping each of the following: 1) negative masculine traits: aggressive, dictatorial, arrogant (αs = 0.80 & 0.75, for men and women, respectively); 2) negative feminine traits: nagging, whiny, complaining (αs = 0.92 & 0.89); 3) positive masculine traits: courageous, adventurous, stands-up under pressure (αs = 0.82 & 0.73); and 4) positive feminine traits: nurturing, gentle, sympathetic (αs = 0.80 & 0.75).

4.1.5.2. Sexual orientation. Following filler ratings of their expectation of the race and political party membership of the speaker, using an 11-point scale, participants indicated the speakers' likely sexual orientation from gay/lesbian (-5) to bisexual (0) to heterosexual (5).

4.1.5.3. Evaluation of argument. Using a five-point scale (1 = "strongly disagree"; 5 = "strongly agree"), participants rated the extent to which the argument was persuasive, strong, convincing, weak, ineffectual, and flimsy (αs = 0.95 & 0.95, female and male participants, respectively). Participants also evaluated the policies. See supplemental materials.

4.2. Results

4.2.1. Overview

Parallel analyses were conducted for Study 3a and 3b. First, perceived strength of the arguments was submitted to a 2(Argument frame: Business-science vs. ethical-justice) x 2(Argument position: Pro vs. con) between-participants ANOVA.[2] These analyses tested direct effects of argument frame on perceived strength of the arguments. Based upon gender matching, in Study 3a we predicted that men would find the business-science arguments stronger than the ethical-justice arguments. Based on masculinity research (and results of Study 2 with men being more likely than women to demonstrate gender-matching), in Study 3b, we did not predict gender-matching tendencies for women.

Second, Hayes's (2013) PROCESS macro with parallel mediation was used to test whether: a) the speaker's use of science-business or ethical-justice argument frames influenced whether the speaker was perceived to be gender deviant and b) whether this perception of deviance mediated the relation between argument frame and evaluation of the argument frame. Preliminary analyses indicated that the effects were not moderated by argument position. Therefore, these results are not presented here. The reported betas in these analyses represent non-standardized effects.

The first step of the mediation analyses tested whether the speaker was perceived as a gender deviant when he or she used gender-role incongruent arguments. In this step, gendered ratings of the speaker (i.e., positive/negative masculine and feminine traits and sexual orientation) were regressed on argument frame. In Study 3a, we expected men to be more likely to rate a male speaker using ethical/justice arguments as more gender deviant (i.e., more feminine, less masculine, and more likely gay) than a male speaker using a science-business argument. In Study 3b, we expected women to be more likely to rate a female speaker using science-business arguments as more gender deviant (less feminine, more masculine, and more likely lesbian) than a female speaker using ethical-justice arguments.

The second step of the mediation analyses tested the relation between gender deviance and evaluation of the policy arguments and tested for indirect effects. In this step, participants' ratings of the strength of the argument were regressed on argument frame, trait ratings, and perceived sexual orientation. We predicted stronger positive trait ratings would be positively associated with perceived argument strength and stronger negative trait ratings and perceived homosexuality would be negatively associated perceived argument strength. Critically, we predicted significant indirect effects indicating that the gender deviance ratings would mediate the relation between argument

[2] A 2(Argument frame) x 2(Argument position) x 2(Participant Gender) yielded a significant three-way interaction, $F(428) = 6.00$, $p = .02$, $\eta^2 = .01$, justifying the separate analyses for men and women.

frame and perceived strength of the arguments. Although excluded from the report of results below for the sake of brevity, it is notable that all results remained significant when controlling for participants' political orientation and political party identification.

4.2.2. Study 3a: male participants

Supporting gender-matching predictions, a 2(Argument frame: Science-business vs. ethical-justice) x 2(Argument position: Pro vs. con) ANOVA indicated that men were more likely to perceive science-business arguments (M = 3.34, *s.d.* = 1.16, 95% *CI* [3.11, 3.58) as being stronger than ethical-justice arguments (M = 2.91, *s.d.* = 1.19, 95% *CI* [2.66, 3.16), $F(1176) = 6.38$, p = .03, $\eta^2 = 0.03$. Men were also more likely to perceive the con arguments (M = 3.32, *s.d.* = 1.16; 95% *CI* [3.06, 3.55) were stronger than the pro-arguments (M = 2.96, *s.d.* = 1.19, 95% *CI* [2.71, 3.19), $F(1176) = 4.20$, p = .04, $\eta^2 = 0.02$. Argument position (pro- or con-) did not interact with argument frame.

Consistent with prediction that gender non-matching speakers would be more likely to be seen as gender deviants, the first step of the parallel mediation analyses revealed that men perceived the male speaker as being more likely to be gay, Beta = 0.69, *s.e.* = *0.32,* $t(178) = 2.18$, p = .03, have positive feminine traits, Beta = −10.56, *s.e.* = *3.43,* $t(176) = -3.08$, p = .002, and have negative feminine traits, Beta = −14.83, *s.e.* = *3.90,* $t(178) = -14.83$, p = .002, when the speaker used ethical-justice arguments than science-business arguments. Consistent with the prediction that gender deviance would explain evaluation of arguments, in the second step of the analyses, the more the man was seen as having negative feminine traits, the weaker arguments were perceived to be, Beta = −0.02, *s.e.* = *0.004,* $t(173) = -6.91$, $p < .001$ and the effects for negative feminine trait ratings produced a significant indirect effect (0.37, 95% *CI*[0.18, 0.63]). There were no indirect effects for the other trait ratings and anticipated sexual orientation because the gendered arguments did not predict the other trait ratings and/or other trait ratings anticipated sexual orientation were not associated with evaluation of the arguments.

4.2.3. Study 3b: female participants

A 2(Argument frame) x 2(Argument position) ANOVA did not support the presence of a gender-matching bias for women's attitudes. A main effect for argument frame, $F(1252) = 9.96$, p = .002, $\eta^2 = 0.04$, was qualified by an interaction between the gender of the argument and position of the argument, $F(1252) = 21.33$, p = .001, $\eta^2 = 0.08$. Contrary to gender matching, women were more likely to perceive the science-business con-argument (M = 3.97, *s.d.* = 0.79, 95% *CI* [3.72, 3.10]) as stronger than the ethical-justice con-argument (M = 3.00, *s.d.* = 1.04; p < .05, 95% *CI* [2.75, 3.25], $p < .001$) and they did not perceive the science-business pro-argument (M = 3.35, *s.d.* = 1.04, 95% *CI* [3.11, 3.60]) and ethical-justice pro-argument, (M = 3.53, *s.d.* = 1.07, 95% *CI* [3.29, 3.77], p = .30) to differ.

In support of the prediction that gender non-matching women were more likely to be seen as deviants than gender matching women, the first step of the mediation analyses revealed that women were more likely to perceive the female speaker as having more negative masculine traits, Beta = 5.17, *s.e.* = *2.67,* $t(253) = 1.94$, p = .054, and less positive feminine traits, Beta = −14.20, *s.e.* = *2.72,* $t(253) = -5.22$, p = .002, when the speaker used science-business arguments compared to ethical-justice arguments. In support of the prediction that gender deviance effects would be weaker for women than men, there was only weak support for mediation on these traits for women which contrasts with the support for mediation for men. Specifically, in the second step, the more the woman was seen as having negative masculine traits, the weaker the arguments were perceived to be (Beta = −0.007, *s.e.* = *0.004,* $t(248) = 1.83$, p = .07). However, the latter path was marginally significant and indirect effects were marginally significant (−0.04, 90% *CI*[−0.10 to −0.004]). There were no indirect effects for the other trait ratings and anticipated sexual orienation because the gendered arguments did not predict the other trait ratings and antcipated sexual orientation and/or other trait ratings and antiricipated sexual orientation were not associated with evaluation of the arguments.

4.3. Discussion

Supporting predictions, gender matching was more evident in men's attitudes about climate change policy arguments than women's attitudes about the arguments. Men, on average, evaluated the science-business framed arguments more positively than the ethical-justice framed arguments − independent of whether or not the arguments supported or opposed the policies and men's political beliefs. In contrast, women on average evaluated the masculine con arguments more favorably than the feminine con-arguments and showed no preference between the masculine and feminine pro-arguments.

Supporting predictions that speakers that used gender-role incongruent frames would be perceived as gender deviants, results indicate that there may be social costs to speakers who choose to use gender incongruent arguments in terms of being perceived as gender deviants. Men, on average, were more likely to perceive the man who used ethical-justice (vs. science-business) arguments as gay and attribute both positive and negative feminine traits to him. Women, on average, were more likely to attribute negative masculine traits and less likely to attribute positive feminine traits to a woman who used science-business (vs. ethical-justice) arguments.[3]

Furthermore, consistent with predictions, mediation effects were found, and effects were stronger for men than women. Men's impressions of the male speaker as having negative feminine traits (which was strongest when the male speaker used ethical/justice arguments) was negatively associated with perceived argument strength. Further, indirect effects supported mediation effects for negative feminine traits. Thus, the results indicate that perceiving men who use gender-role incongruent arguments as being gender deviants can influence men's evaluations of those arguments. Women's impressions of the female speaker as having negative masculine traits (which was strongest when the female speaker used science-business arguments) was associated with less positive evaluations the argument albeit the effect was marginally significant resulting in marginal indirect effects.

5. General discussion

This research examines reasons for differential use of science and business frames versus ethical and justice frames. Our research suggests that the gendered nature of these two frames presents a barrier to for men putting forth ethical and justice perspectives. Both science and business considerations as well as ethical and justice considerations are important issues when developing climate change policies. Moreover, we are not claiming that one type of argument would necessarily be more persuasive than another. Rather, we are arguing that preferences have potential implications for what is included in the discourse about policies, and, as a result, the development of policies and perceived assurance of procedural justice via feelings of inclusion among those who are impacted by policies (Nagel, 2012; Tyler and Blader, 2003). By studying preferred ways to frame policies, our work extends prior research on policy discourse and climate change concerns, which has typically addressed whether individual differences (e.g., in environmentalist identity), political orientation, and/or gender influence climate change concerns and/or policy support (e.g., Gruber, 2013; Fisher et al., 2013; Hornsey et al., 2016). As such, the present theory

[3] Men might share the same perceptions of female speakers as women and women might share the same perceptions of male speakers as men. However, the point of Study 3 was to test whether men and women would see same gender speakers as gender deviants and whether this perception might impact the perceived strength of different policy arguments. Future studies should investigate these effects across genders.

and research point to important issues that can enhance and impede climate change communication, collaboration, and education.

5.1. Summary

Our research illustrates that climate change arguments can be gendered. The gendered nature of climate change discourse is not just that pro-arguments are associated with women and con-arguments with men, as one might suspect given gender differences in concern for climate change (e.g., McCright, 2010) and expected gender differences in these concerns (Swim and Geiger, 2018). In addition to these expectations, pro- and con-arguments about ethics and justice that align with traditional feminine care taking roles are associated with women more than men. By contrast, arguments about science and business that align with traditional masculine roles are associated with men more than women.

Consistent with research on masculinity, men are more likely than women to display gender matching effects. Men found science-business related arguments more appealing than ethical-justice related arguments, whereas woman displayed no preferences. Also, relative to a man who used science-business frames, men viewed another man who used ethical-justice frames as being more likely to be gay and to have feminine traits; perceptions of the man as having negative feminine traits was subsequently associated with seeing the policy argument as weaker. These effects remained significant when controlling for political orientation. Thus, the results do not appear to be due to men being more likely to be conservative than women (Winter, 2010).

Women's expectation that a woman would be seen as having negative masculine traits created a marginal indirect effect on evaluation of policy arguments. Relative to a woman who used ethical-justice frames, women viewed another woman who used science-business frames as a gender deviant (being more likely to have negative masculine traits and less likely to have positive feminine traits). Perceptions of the woman as having negative masculine traits was also subsequently associated with seeing the argument as weaker. Yet, the latter association was marginally significant. The presence of significant direct and indirect gender-matching effects for men, but only marginal indirect effects for women, suggest that the concerns about gender deviance are more powerful determinants of men's attitudes and behaviors than women's attitudes and behaviors.

5.2. Implications

The results provide a possible explanation as to why the dominant climate change social movement in the United States and potentially other industrialized countries is one that focuses on science and business. Although women on average show no preferences between various policy framing, men on average prefer to focus on science and business over ethical and justice concerns. Because men are more likely to be in positions of social influence due to men being more likely to be climate scientists, business leaders, and political leaders (Eagly and Karau, 2002; Nagel, 2012), men are more likely than women to have more influence over the ways that climate change agendas are framed. The result is that the extent to which ethical and justice considerations enter into the discourse about climate change may be minimized relative to a science and business frame.

The imbalanced representation of frames is problematic because emphasizing science and business arguments can communicate, at least implicitly, the lack of perceived importance of a caring perspective, potentially alienating those who take this perspective (Tyler and Blader, 2003). Additionally, there may be times when minimizing a communal perspective becomes an ethical issue. For instance, an often-referenced goal of limiting climate change to an overall 2° centigrade increase sounds scientifically grounded and appears to be based upon an economic cost-benefit analysis of climate change impacts, but this target ignores the environmental justice issues associated with this global average increase (Seager, 2009). That is, this goal misses the variability in temperature around this 2° target and the disproportionately harmful impacts of increases in temperature that are already having on the poor. Those who suffer the most from the costs of climate change come from poorer regions of the world and poorer regions within countries.

The results support the United Nations' efforts to include more women as delegates and committee members on discussions about climate change (WEDO, 2016). Our results suggest, however, that the reason for inclusion is not just because there are particular impacts that women experience more than men, but because women may provide a stronger voice for ethical and justice frames. The results do not suggest that men cannot take ethical and justice perspectives, as evidenced by prominent men who have taken this stance (e.g., Pope Francis). Instead, our results indicate that it might be particularly important for men to hear other men emphasize this position to counteract stereotypes about those who voice these male gender-role incongruent positions. The importance of having strong male figures express ethical and justice frames could have, in part, contributed to an increase in concern among 17 percent of all Americans and 35 percent of Catholics about climate change when Pope Francis interjected ethical and justice frame into the US discourse on climate change (Maibach et al., 2015).

5.3. Limitations

Actual behaviors were not assessed. Future research should use varied methodology to examine the generalizability of the effects that emerged via self-report and imagined behavioral intent. The tendencies noted here likely guide their initial choices and may reflect their default considerations. Past research indicates that our effects may be as likely in private as in public. Public displays may not be necessary if men have internalized the norms (Maass et al., 2003), and masculinity threat has been demonstrated in private contexts (Vescio et al., 2016). Additionally, other research suggests that our gender effects would be stronger if they were made publically. Some have argued that it is in public contexts that men will receive the most hostility if they behave in a gender-incongruent fashion (Bosson et al., 2006).

The samples limit some of our conclusions. The samples were not randomly selected. Although, participants in Study 1 and 3 were from the general public, the sample from Study 2 was comprised of undergraduates. Parallel gender matching findings for selection of the arguments in Study 2 and evaluations of the arguments in Study 3 suggest the generalizability of our gender matching effects on framing preferences. Although future research can test the generalizability of our findings, the presence of gender matching effects here and in other research (Diekman et al., 2013; Diekman and Schneider, 2010; ; Eagly et al., 2003) suggest that similar results would be found in a more representative sample. Further, although our samples, were more liberal than the general public, also suggesting the generalizability of gender matching effects, our effects remained after controlling for political beliefs and concerns about climate change.

Our findings may be limited to the policies we tested. Pilot testing indicates that respondents were not familiar with the policies we selected, as well as 21 other policies we tested. Thus, although familiarity may be a limiting factor, it is not likely unique to the present study.

The study designs may have increased the likelihood that we would find gender-matching effects. Participants in Study 1 may not have thought about gender possibility if we had not asked them this question. In Study 3, although we did not identify the traits as being masculine or feminine, the traits may have been seen that way because they were selected to be masculine and feminine. However, in contrast to this concern, in Study 2, we did not provide gender cues and the gender-matching hypothesis was still confirmed.

5.4. Future research

Future research should examine the practical implications of our

findings. First, consequences of gendered arguments could be examined, such as perceived procedural justice and feelings of inclusion (Tyler and Blader, 2014) and whether particular types of arguments silence speakers (c.f., Geiger and Swim, 2016).

Second, research could assess default arguments. Because science and business frames are default frames in the United States, women and men may not differ in what comes readily to mind when they think about policies. Default tendencies to mention ethical and justice arguments may be more strongly predicted by other factors such as environmental identity (Clayton and Opotow, 2003; Swim and Bloodhart, 2018).

Third, research could test the generalizability of results to other countries and people based upon economic status. As noted in the introduction, climate change social movements that use scientific and business frames are more popular in economically wealthy countries (Caniglia et al., 2015). Many of those on the forefront of climate change action in poorer regions of the world are women and they are voicing ethical and justice issues (see Klein, 2015). In these regions and potentially for poorer people even within wealthy countries, gender matching and cultural context might support women using ethical and justice frames over alternative frames, and men might be influenced by both the dominant frame and gender roles.

Fourth, future research might assess whether preferences for justice frames focus on the rights of people or the biosphere. People might be more concerned about impacts on people, but they may also expand their scope of justice to nonhumans (Opotow, 1990; Swim and Bloodhart, 2018).

Fifth, future research could determine the basis of assumptions about men's and women's endorsement of different argument frames. Characteristics of people that co-vary with both a person's gender and the preferred frame may explain expected gender differences. For instance, expectations about gender differences in preferring ethical-justice versus science-business frames may be a result of linking these preferences to expected gender differences in preference in attenuating versus accentuating or maintaining hierarchies. The latter expectations would match actual gender differences in preferring social hierarchies (Ho et al., 2015). However, it is difficult to disentangle preference for hierarchies from male role norms given how central dominance and desire for status is tied to gender identity (Lee, 2005) and masculinity (Dahl et al., 2015; Vescio et al., 2010). Another possibility is linking liberal or conservative ideologies with framing preferences. Liberals prioritize fairness and justice principles more than conservatives (Graham et al., 2009) and women may be expected to be more liberal than men. Yet, the politicization of climate change is likely more strongly associated with policy support (Hornsey et al., 2016), and here, selecting pro versus con arguments, than frames within pro versus con arguments as tested here. That is, we find gender effects within what may be considered liberal and conservative positions. None-theless, more could be done to understand why people come to associate different frames with different genders.

Finally, it may also be important to examine discourse surrounding policies more directly related to social justice concerns, such as policies that support indigenous people's rights to decisions regarding extraction of fuels and minerals from their lands (Klein, 2015), and policies designed to help local communities adapt to climate change. Both women and men may find ethical and justice arguments stronger than the science and business arguments for these policies because they are more obviously related to the topic.

5.5. Conclusions

Arguably, even the United States has proceeded past the point where only a minority are indifferent to environmental problems, including climate change, and most countries have entered a point where discussions about policy options is emerging rather than questions about the existence of the threat from climate change (Castro and Mouro, 2011; Leiserowitz et al., 2014; Swim et al., 2014). As such, it is important to understand how environmental policies are being framed and how framing arguments influences climate change discourse (Caniglia et al., 2015).

Our research indicates that it is worth attending to the role of gender on the discourse about climate change, independent of political orientation. From a practical view, it is important to attend to science and business when addressing climate change. But from an ethical point of view, it is important to attend to the costs and benefits of proposed ways to address climate change for those most vulnerable to climate change − animals, and certain segments of the population, typically those that are the poorest (Swim and Bloodhart, 2018). It is important to understand how gender influences these discussions because men's greater social, political, and economic power could potentially result in a minimization of justice issues for reasons external to the validity and importance of this perspective.

Funding

The authors disclosed receipt of the following financial support for the research and/or authorship of this article: National Science Foundation (NSF-BCS #1152147) awarded to Janet K. Swim and Theresa K. Vescio.

Conflict of interest

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

Acknowledgements

The authors would like to thank Anna Vargo for her help proofreading the paper.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.gloenvcha.2017.12.005.

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